Harnessing the Potentials of Internet Technology for Research and Development among Undergraduates in Nigeria: A Case Study of Obafemi Awolowo University

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Abstract:
This paper focuses on the potentials of the internet in facilitating research in Nigerian universities. We assess the readiness of undergraduates in Nigerian tertiary institutions to deploy the internet for research purposes. The data provides evidences on the capacities and capabilities of the existing facilities, human resources and the readiness of the entire stakeholders to use internet facilities for research and development. We observe that there is a gender difference in internet use and thus adequate attention should be paid to ensuring equal access between male and female students. The study also establishes that the present level of capabilities for internet-assisted research is encouraging and that improving internet facilities in our universities will enhance academic research in Nigerian tertiary institutions if strategically embarked upon. The study reveals, contrary to expectations, that access to personal computers has little to do with students' readiness for internet-assisted research. Specific policy implications are drawn for relevant stakeholders.

Categories and Subject Descriptors: H1.2 [**Models and Principles**]: User/Machine Systems - *Human factors*; *Human information processing;* K3.0 [**Computers and Education**]: General; K4.0[**Computers and Society**]: General

Additional key words and phrases: internet-assisted research, Nigeria, tertiary institutions, internet usage, students, strategies

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1. INTRODUCTION

Information Communication Technology (ICT) has now broadened the horizon of the opportunities among institutions of higher learning, giving hopes to members of the academic communities to cooperate with their counterparts all over the world [Collis and Wende, 2002; OECD, 2005], and strengthened their mandates of teaching and carrying out research [CHEPS, 2000]. The internet falls into the category of this set of technologies. Specifically, the internet has been seen as an important vehicle to propel higher education to greater heights as the world moves further into the

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knowledge economy in this century. Basically, there are two major classes of educational delivery [Collis and Gommer, 2001; Collis and Moonen, 2001]. The first class has to do with whether an institution wants to go global or develop its capacities locally. The other class refers to the contents and programs of the institution and the delivery methods. Part of this paper is situated within the context of the latter. The paper looks at the potentials inherent in internet technology and highlights how useful it is for enhancing the efficiency of pedagogy as well as facilitating research in institutions of higher learning. Another part of the paper presents evidences on the apparent readiness of key relevant stakeholders (most especially the students) for internet-based research in Nigerian tertiary institutions.

The paper is structured as follows. The next section outlines our discussion of the documented impact of the internet as well as its potentials for enhancing teaching and research in the tertiary education sector. The method employed in the empirical study that this paper draws on is then laid out in Section 3, followed by a discourse of the key results in Section 4. Specific implications of the findings are brought out in Section 5 where the paper also concludes.

2. THE INTERNET: IMPACTS AND POTENTIALS

The internet has been described as a rich, multi-layered, complex and ever-changing textual environment [Jagboro, 2003]. It is now widely used as a medium of communication among researchers and students in higher institutions. For instance, Wilkinson *et al.* [2003] reported that most of the links between universities' homepages were associated with information on research or education. In the same vein, Chavez [1997] opined that internet and computer usage has impacted positively on critical thinking, problem solving, prompt feedback and networking. The strength of the internet lies in the unprecedented growth of its network world wide and its ability to connect computers and several individuals without the barrier of geographic space. It has been applauded as one of the most significant technological developments of the 20th century and it is viewed as poised to impact academic research significantly in the near future.

In a survey of over 2000 teachers, Becker [1999] showed that most teachers are likely to use internet for educational purposes rather than for entertainment. This is in line with the findings of Adogbeji and Toyo [2006] who reported that more than 90% of their sample (lecturers) indicated that the internet has added value to their academic pursuits in terms of quick access to research materials, including online journals. Another study by Rajeev and Amritpal [2006] found that more than 74% of students reported that they used internet for educational purposes. Adeya and Oyelaran-Oyeyinka [2002] also noted that the internet will increase student access to education, improve curriculum and quality of instruction and increase productivity of academic publications. In the same fashion, Ramayah et al. [2003] reported that most students use internet because of the perceived effectiveness of the facility in information access on assignments and research projects. In Nigeria, Awoleye and Siyanbola, [2006] reported an average usage of 3.5hrs/week among Nigerian undergraduates, pointing to the students' perception on the importance of the internet.

In a study conducted by Glenda et al. [2006], some of the most important reasons why students go online include research, school assignments, e-mails and chatting. In a study of postgraduate students in a tertiary institution, Jagboro [2003] discovered that students used internet mostly for research purposes. This is further supported by the report of Ibegwam [2004] and Chinwe [2006] which noted that majority of the students used the internet for academic purposes. As a matter of fact, majority of higher institutions of learning have now established their online presence with their researchers and students also having access to journals, magazines, newsletters and books [Jagboro, 2003]. Beyond the foregoing advantages of the internet, students at most higher institutions of learning now register for their courses, submit assignments and check results online. From the foregoing, one could infer that using internet for academic purposes is not new to students in Nigerian institutions [Awoleye and Siyanbola, 2006]. Therefore, deploying it for academic research among these students should not be difficult.

However, the foregoing argument is only intuitive and requires empirical support. It is against this background that the case study reported herein was conducted with the intention to establish the proficiency, and hence the readiness of Nigerian undergraduates to deploy internet resources in research and development. The analyses were carried out specifically to find out if there are inequalities based on demographic and other factors such as age, gender and level of study in the use of the internet. This type of information will throw light on the areas where particular attention needs to be paid and the gaps that need to be closed for effective deployment of the internet for academic research.

3. EMPIRICAL METHODOLOGY

The survey reported here took place in Obafemi Awolowo University, Nigeria. The choice of the selected institution was based on its reputed position as the nation's leading ICT university and a veritable centre of excellence in teaching and research [Awoleye and Siyanbola, 2006]. The main survey instrument was a structured questionnaire supplemented with direct observations of the relevant groups. Questionnaire was used as the main instrument because of its strength in being able to collect more information [Obasi, 1992] than interviews [Ndagi, 1999]. A total of 300 questionnaires were administered among students and a response rate of 96% was achieved. The questionnaire elicited information from the respondents on their internet access points; usage experience; frequency of internet use and the constraints encountered during access to the internet. The relationship between internet access and access to computers was also explored. To ensure coverage of all relevant demographic and academic indicators, respondents were selected across different academic disciplines. The significance of the demographic variables was later tested.

Descriptive and inferential statistical procedures were used to analyse the data. These analyses were carried out in order to examine the readiness of the students in the adoption of internet for research. Internet usage, captured by directly asking respondents to indicate whether or not they use the internet, was taken as the dependent variable while variables relating to respondents' demographics and internet access constituted independent variables.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Case Background

Obafemi Awolowo University was founded in 1956 as one of the first-generation universities in Nigeria. Alongside 4 other universities, it was founded at a time when the need for indigenous tertiary educational institutions was just becoming more obvious in the nation. At inception, the University like its contemporaries, enjoyed considerable support from the Nigerian government as well as Western institutions and governments to the extent that scholarships were abundant for its undergraduates and for fresh graduates that sought further study. The university has also maintained a standard of academic and cultural excellence which make it to attract students from various parts of the world.

In a way, the extensive global exposure that the faculties, students and alumni of the university possess bestows some technological support on it. One of the most notable of such advantages is the frequent provision of certain infrastructure for the institution by alumni and donor agencies. A key area where such interventions are most pronounced is in the provision of computing facilities. For instance, the World Bank and the New York-based Carnegie Corporation provided ICT capacity-building assistance to the university. The Carnegie Corporation also endowed the university with a fully-functional information technology laboratory. Similarly, the Co-operative Information Network (COPINE) which has its main office on the university campus makes computer systems available to staff and students at giveaway prices [Awoleye et. al., 2008].

In aggregation, the foregoing advantages have brought about a high prevalence of computer systems within the university. This is in addition to the presence of about 5 cyber-cafes at various spots within the university premises. In fact, 2 of these cafes are actually located within student hostels. In addition to that, the university has its own broadband internet facilities and recently deployed wireless internet access to cover students' hostels and faculties. As such, there is almost no office in the entire university where at least a computer connected to the internet will not be found. Also, most academic staff possesses personal computers.

In contrast, a sizeable proportion of the over 20,000 undergraduate students of the university do not own computers. These students, on their own, thus make conscious efforts to acquire better skills in the use of computer for their academic work, particularly research projects. For instance, 137 undergraduates from the social sciences were trained at the National Centre for Technology Management in research methodology and the use of popular statistical software. This training was organized in partnership with the student association of Demography and Social Statistics of Obafemi Awolowo University, Nigeria.

However, as will be seen in the following sections, in spite of the apparently extensive support mechanism, several factors still need to be taken into consideration in ensuring that the students use the internet for research more effectively.

4.2 Factors relating to internet usage: predictors of students' readiness for internet-based research

4.2.1 Students' age and their usage of the internet

The information furnished by Table 1 indicates that internet usage is much more pronounced among the younger students than among their older counterparts. Specifically, students aged between 22 and 28 would use the internet more than those of any other age group. In total, over 90.0% of the students who use the internet are within the age group of 18 and 28 years. Within the Nigerian context, this is to be expected as the tertiary level of education is populated with young persons within that age range. The implication of this result is that students in this age group are most likely to adopt IT for their future researches. Also for internet-based researches that are student- or youth-oriented, this presents a particularly exciting opportunity.

The result of the correlation analysis shows that age of the students does not have significant influence ($r = -0.079$, $p>0.05$) on their usage of the internet. This is a good result because it implies that, although there is an imbalance in the usage of the internet between younger and older student categories, students of all age groups would likely use the internet irrespective of their age and by extension, using the technology for their research will not be too difficult.

Table 1: Age distribution and internet access of the respondents

Age Group	**Internet usage (%)**	
	Internet users (n = 145)	Non-users of internet (n = 109)
18 – 21	40.69	48.62
22 – 28	55.86	48.62
29 – 35	2.76	2.75
51 – 70	0.69	0.00
Total	**100.00**	**100.00**

Source: Authors' Survey, 2006

4.2.2 Influence of Gender on internet usage

The analysis in Table 2 shows the differences in internet usage among male and female students. The table indicates that the level of internet adoption among male students is higher (53.53%) than that of their female (46.47%) counterparts. Table 2 also shows that there is a difference between the readiness of male undergraduates in the use of internet for research than that of their female counterparts as established by the result of the correlation analysis. The analysis shows that gender has a significant effect ($r= 0.263$; $p<0.01$) on internet usage. The implication of this is that male students are more likely to readily use the internet for research than their female counterparts.

These results agree with some studies [Kay, 1992; Shashaani, 1997; Schumacher and Morahan-Martin, 2001 and Ono and Zovodny, 2003] which found that males are more likely to use the internet more often than females and disagree with some [Jennings and Onwuegbuzie, 2001; Shaw and Gant, 2002] which found no significant gender difference in computer attitude. These mixed results have been attributed to differences in methodologies or increase in the number of female internet or computer users [Mitra et. al. 2005]. Nonetheless, the need for gender-sensitive strategies in the promotion of pedagogical use of the internet is still brought forward.

Table 2: Gender distribution and internet usage

	Internet usage (%)	
	Internet users (n=170)	Non-users of internet (n = 100)
Male	53.53	27.12
Female	46.47	72.88
Total	**100**	**100**

Source: Authors' Survey, 2006

4.2.3 Influence of students' level of study on their usage of the internet

In an attempt to find out if there is any variation in internet usage among students of various class levels, a cross-tabulation of internet usage and the levels of students was carried out. Table 3 contains the result of the analysis. 300 level students were found to have the highest level (37.65%) of internet usage, closely followed by their 200 level counterparts. Internet usage is least (2.35%) among

the 500 level students. It could be inferred from this that majority of the students who had already established their online presence are between 100 and 300 levels. The reasons for this high level of internet usage has been explained by Chinwe [2006] who reported that this category of students use internet so as to get quick information for their term papers and industrial training reports. This is a good result for internet adoption for research because it is believed that these students would be more familiar with online/web applications as they move up the class in their respective departments. A negative significant relationship ($r = -0.208$, $p < 0.01$) was found between class levels and internet usage. This implies that class levels do influence internet usage and by inference may also influence its usage for research. It also indicates, albeit counter-intuitively that those in lower classes would more readily deploy the internet for research than those at the upper classes.

Table 3: Class level distribution and internet access of the respondents

Class Level	**Internet usage (%)**	
	Internet users (n=170)	Non-users of internet (n = 117)
100 Level	21.18	31.62
200 Level	30.00	41.03
300 Level	37.65	23.08
400 Level	8.82	4.27
500 Level	2.35	0.00
Total	**100**	**100**

Source: Authors' Survey, 2006

4.2.4 Access to personal computer system as a motivator for internet usage

Expectedly, access to a personal computer system would be a motivator for internet usage among students. The reason for this might not be unconnected with the fact that majority of the students would like to read their stored or downloaded information from the internet at their own convenient time on their personal computer systems. A significant positive relationship ($r = 0.27$, $p<0.01$) was found between access to personal computer system and internet usage among students. This means that access to personal computer influences internet usage. However, the results in Table 4 show that majority of the students who use the internet (63.91%) do not have personal computer (PC) systems. Nonetheless, the fact that a higher proportion of those that have PCs use the internet might mean possession of a PC positively influences internet usage. Along that line, the positive significant correlation found between the two variables is an indication that the more the access to personal computer systems, the higher the level of internet usage among students; and the higher the level of internet usage the higher the possibility of appreciating its potentials to academic research. Besides, the result of Table 4 is a manifestation of the fact that majority of the students do not have personal computer systems and that more than 80.0% of them access internet from cybercafes or university facilities. This agrees with the result of Jagboro [2003] who claimed that majority of the students surveyed use cybercafes. The use of cybercafe as an access point to internet does not exclude the lecturers as well [Adogbeji and Toyo, 2006 and Awoleye, et. al., 2008].

Table 4: Access to personal computer system and internet usage of the respondents

	Internet usage (%)	
	Internet users (n=169)	Non-users of internet (n = 118)
PC Owners	36.09	11.86
Non-owners of PC	63.91	88.14

Source: Authors' Survey, 2006

4.2.5 Frequency and cost of internet use among the students

Table 6 shows a particularly encouraging trend. Majority of the students (66.27%) use the internet weekly while 27.22% of them use it daily. Taken together, over 90.0% of the students use the internet regularly. These figures agree with those of Machmias et al. [2000] and Ramayah et. al., [2003] and surpass that of Glenda et al. [2006]. All things being equal, this could translate to a high level of readiness for using IT for academic research among Nigerian students.

Table 6: Regularity of internet use among students

Frequency of Internet Use	**Percentage** (n=169)
Daily	27.22
Weekly	66.27
Monthly	5.33
Yearly	1.18
	100

Source: Authors' Survey, 2006

In spite of this, however, the cost of accessing the internet is high, as evidenced in the fact that close to half of the students indicated spending close to 2 dollars per week to get access. Among Nigerian students, many of whom would generally have to spend much time online (due to numerous term papers and assignments), this seemingly insignificant charge would ultimately amount to much. Moreover, we found a significant negative relationship ($r = -0.36$, $p < 0.01$) between the cost incurred by the students in accessing the internet and their intensity of use. This leads us to believe that these students would be more encouraged if the infrastructural problems that compel them to go after commercial points of access were addressed.

5. SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

The paper found an improvement over previous studies on level of internet usage and frequency of use. An implication of this may be that a significant majority of the students would readily adopt IT for academic research. Ironically, very few students have access to personal computers; and there was no significant correlation between this and the respondents' level of internet usage. Access to non-personal computer systems was found to correlate significantly with the respondents' usage of internet; indicating that non-possession of personal computers does not necessarily discourage the adoption of IT for academic research among undergraduates. It also suggests that enhancing the capacity for computer usage may be more important than encouraging individual possession of computers as far as using IT for academic research is concerned.

The study also found that male undergraduates used the internet more frequently than their female counterparts. These show that the male students might adopt IT for academic research more enthusiastically. In addition, following from the predominant level of internet usage that we found among the lower level students, it appears that they will readily adopt IT for academic research compared to their senior counterparts. Among the key constraints in internet usage that we found were financial constraints and infrastructural deficiencies. Several suggestions were proposed for the deployment of IT for academic research in Nigerian tertiary institutions.

We conclude from the foregoing that use of the internet has positive implications for research in Nigeria, especially in tertiary institutions. The present level of capabilities for internet-assisted research is also encouraging. Contrary to common expectation, access to personal computers has little to do with students' readiness for internet-assisted research. It then follows that students do not have to own computers before they can be encouraged to employ internet facilities in their research. This makes sense since the mere possession of a PC does not imply guaranteed access to the internet. Nonetheless, when students possess their own computers, particularly laptops which can be moved around quite easily, they might tend to use the internet more readily.

Drawing from the results, we make the following propositions for tertiary institutions to further enhance student research through improved internet use in the Nigerian tertiary institutions:

We propose increased access to computers as the first step in facilitating the deployment of the internet for research purposes. Schemes and programmes could be put in place by institutions to assist students to procure their own PCs. For instance, these systems could be made available at giveaway prices as COPINE had been doing in OAU [Awoleye, et. al., 2008]. Similarly, banks could offer to share or spread the cost of the computer systems for their customers. Encouragingly, many commercial banks in Nigeria already have such programmes.

The establishment of more access points will be an appropriate strategy. Considering the scarcity of financial resources that is prevalent among students, this type of initiative will particularly have a significant impact. Presently in Nigeria, several institutions now have ICT centres where students can use the internet free or at very cheap prices. Private operators could also be involved in the establishment of cyber cafes or internet centres that would have to conform to strict guidelines stipulated by the institutions. Such centres have several advantages key among which are the

facilitation of knowledge sharing when students work together, the creation of beneficial student networks as well as ready accessibility for students who will not have to travel far distances to secure their access to the internet.

Adequate attention should be paid to ensuring equal access between male and female students. This could be done by setting up gender-sensitive centres that grant preferential access to female students.

The challenges posed by deficiencies in support infrastructure, especially power supply, should be considered as serious and appropriate steps should be taken, first by the institution, and then by governments at all levels.

It is believed that these suggestions are applicable to all categories of tertiary institutions in developing countries, especially in Africa.

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